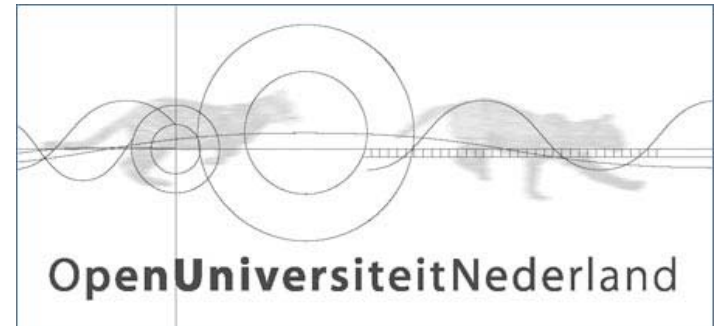


# Integration of IMS Learning Design and eGames



**<e-UCM>**  
e-learning group  
<http://www.e-ucm.es>

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## ☐ Objective: Integration of IMS Learning Design and educational games

- ☐ Definition of a communication model
- ☐ Creation of sample games
- ☐ Creation of a sample Unit of Learning
- ☐ Implementation of the communication model
- ☐ Evaluation of the proposal

## ☐ General data

- ☐ Timeframe: 6 weeks
- ☐ Host researcher: Daniel Burgos
- ☐ Funding: <e-UCM> research group at Universidad Complutense de Madrid

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☐ Established in the early 90's under the direction of **Baltasar Fernández-Manjón** and **Alfredo Fernández-Valmayor**

☐ Areas of interest

☐ E-Learning tools

☐ E-Learning standards and specifications

☐ Markup languages

☐ Alternative approaches to learning

☐ Skill development

☐ Mobile Learning

☐ Game-based Learning

# Prototype of a LMS supporting a simplified version of the original EML

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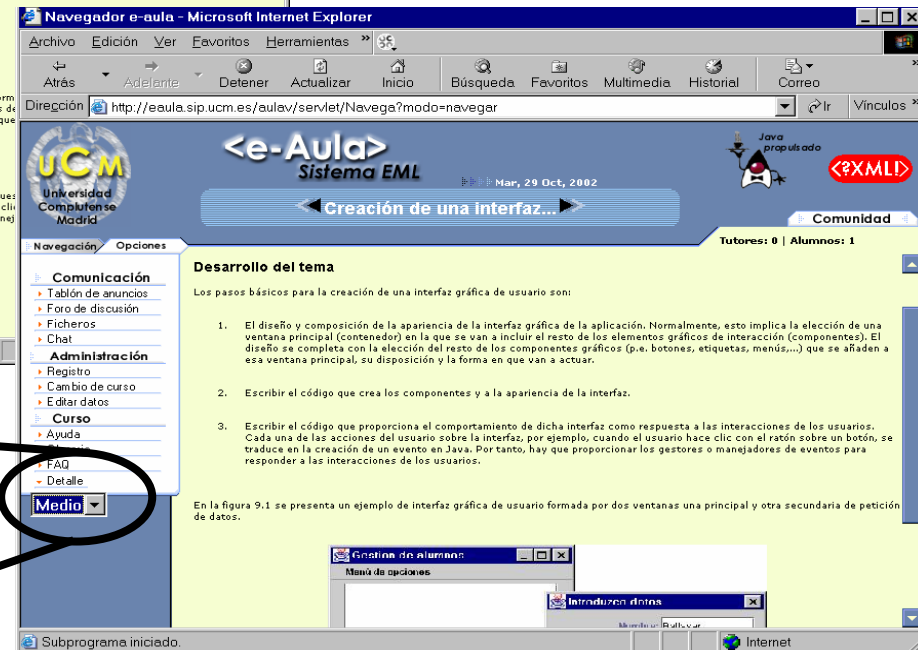
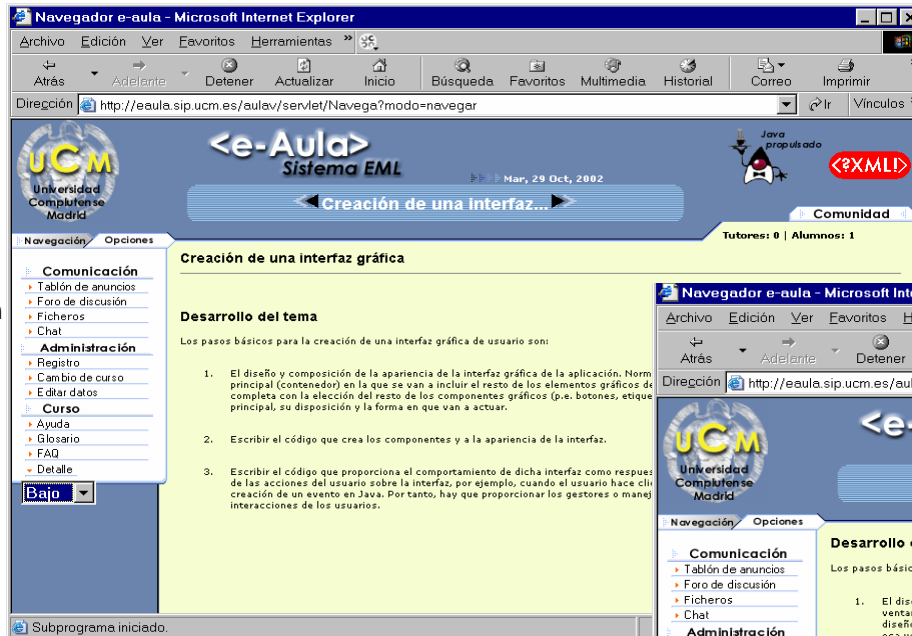
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- ❑ Fully-featured LMS constructed around IMS Specifications (CP, SS, QTI, LIP)
  - ❑ Design and architecture driven by the specifications
  - ❑ Test-bed for further developments

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The screenshot shows the <e-Aula> IMS web application running in Microsoft Internet Explorer. The browser window title is "Sistema E-Aula - Microsoft Internet Explorer". The address bar shows the URL "http://eaula2.sip.ucm.es:8080/aulavIMS/Pablo/EnterSystem.do". The page header includes the <e-Aula> logo, "Sistema IMS", and the date "Lunes, 17 Mayo 2004". A navigation bar contains a "Hall Principal" button. Below this, there are tabs for "Docencia", "Secretaría", "Facultad", and "Otros", and a "Logout" link. The main content area is titled "Edición del Glosario" and contains a paragraph explaining the glossary structure and a button labeled "AÑADIR ENTRADA". The page lists three glossary entries: "Abstracción", "Accesibilidad", and "Acción", each with a description and a red 'X' icon. The status bar at the bottom shows "Listo" and "Internet".

- ❑ Web-based editor / player for IMS QTI 2.0
  - ❑ Service oriented
  - ❑ Can work stand-alone or integrated in other platforms
  - ❑ Authoring, playing, question pools, import/export (WCT Quiz, HotPotatoes)

The screenshot shows the <e-QTI> Assessment Engine web application running in Mozilla Firefox. The browser window title is "<e-QTI> - Mozilla Firefox". The address bar shows the URL "http://localhost:8080/eQTI/tool/src/webapp/jsf/testEdition.faces". The page features a navigation menu on the left with categories like "Instructor profile", "Tests Administration", "Shared Templates", "Question Pool", and "Statistics". The main content area is titled "<e-QTI> Assessment Engine" and contains a form for creating a new question. The form has three sections: "1. Question presentation (required)", "2. Answer definitions (required)", and "3. Grading Information". The "1. Question presentation" section has a text input field. The "2. Answer definitions" section has two "Presentation for response" labels, each followed by a text input field (RESPONSE1: Response1 and RESPONSE2: Response2), and an "Add more possible response" button. The "3. Grading Information" section has a "Select the correct answer" label and two radio buttons (RESPONSE1 and RESPONSE2). At the bottom of the form are "Create", "Clear", and "Cancel" buttons. On the right side of the page, there are "Pending notices" and "News" sections. The "Pending notices" section has a yellow box saying "Your attention is needed for grading". The "News" section shows "Last <e-QTI> news". The footer of the page says "Terminado".

**<e-QTI> Assessment Engine**

Home | Help | Contact information

New Question: Multiple Choice Multiple Election

**1. Question presentation (required)**

**2. Answer definitions (required)**

**Presentation for response**

RESPONSE1: Response1

**Presentation for response**

RESPONSE2: Response2

Add more possible response

**3. Grading Information**

Select the correct answer

☐ RESPONSE1 ☐ RESPONSE2

Create Clear Cancel

**Pending notices**

Your attention is needed for grading

**News**

Last <e-QTI> news

Terminado

- ❑ Graphical editor for IMS-Learning Design
  - ❑ Developed as a Eclipse plug-in
  - ❑ Uses UML diagrams as graphical notation

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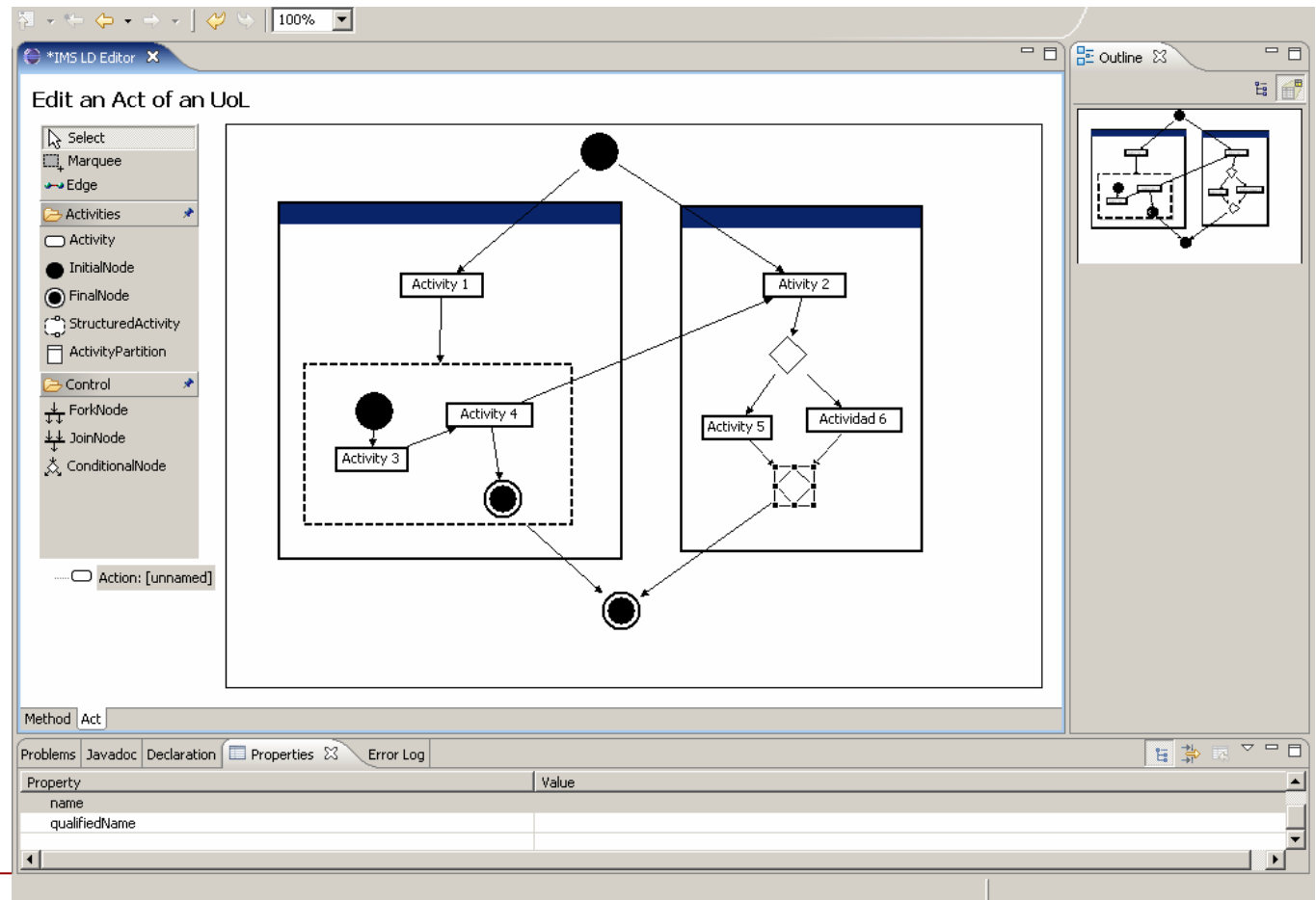
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- ☐ Research & Development work in the field of games and education
- ☐ Addresses four main research questions
  - ☐ Educational game design
  - ☐ Authoring process
  - ☐ Assessment & grading
  - ☐ Integration with existing courseware
- ☐ <e-Adventure> as development project





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### ☐ Complex design equation

- ☐ Educational value
- ☐ Fun and engagement
- ☐ Eye-candy

### ☐ Looking for an appropriate genre...



(images © LucasFilm Ltd.)

### ☐ Point and Click adventure games

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- ❑ Study of the educational potential of the genre
  - ❑ Guidelines for writing interesting adventure scripts with educational value
  - ❑ Study of the different elements of the genre and description of their educational potential
    - ❑ What elements are key for the fun-factor?
    - ❑ What elements are key for the learning outcomes?
  - ❑ Full storyboards for educational adventure games in different fields
- ❑ Conclusions: The genre itself is suitable for learning, but we can add additional elements in the design
  - ❑ Three levels of description of game elements
  - ❑ In-game books that can include sections, titles, images and (eventually) hyperlinks
  - ❑ Tagging of game events according to their educational value

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- ☐ Provide a simple authoring process to facilitate the incorporation of teachers or other domain experts in the development
  - ☐ Domain Specific Language to describe educational point n' click adventure games
    - ☐ XML language
    - ☐ Balance between “simple” and “powerful”
- ☐ Definition of a development process
  1. Provide the script / storyboard
  2. Add descriptive markup to the storyboard
  3. Create / gather art assets (sounds, music, graphics, animations...)
  4. Package the marked up script and the assets and feed them to the <e-Adventure> engine
  5. The engine generates and executes the game

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### ☐ Independent definition of assessment rules

- ☐ The instructor decides which game events are pedagogically relevant
- ☐ Separate XML file with assessment rules included in the game package

### ☐ Monitorization the in-game experience

- ☐ The engine monitors the activity of the learner within the game and matches it to the assessment rules
- ☐ The activation of the assessment rules is logged and written to an XML file
- ☐ Generation of reports with varying degrees of detail
- ☐ The reports are used for grading

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- ❑ <e-Adventure> games as Learning Objects
  - ❑ Potential integration in standards-compliant LMS

## ❑ Different integration approaches

- ❑ Black-box integration
  - ❑ The game is launched as any static content
- ❑ Deep integration
  - ❑ The engine includes an API to communicate with external systems

## ❑ Bi-directional communication

- ❑ The engine can import an initial state and adapt the game according to input from the LMS (user profile)
- ❑ The engine can broadcast the activation of the assessment rules to the LMS

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## ❑ Two main objectives for this stay

- ❑ The design of a *generic* bidirectional communication method between an IMS Player and educational games
- ❑ The implementation of this model enabling the communication between <e-Adventure> and a CopperCore + CCSI + SLeD environment

## ❑ Two resulting products

- ❑ Modified versions of SLeD and CCSI enabling generic bidirectional communication with games
- ❑ An environment to be deployed along CCSI enabling the specific communication with <e-Adventure> games

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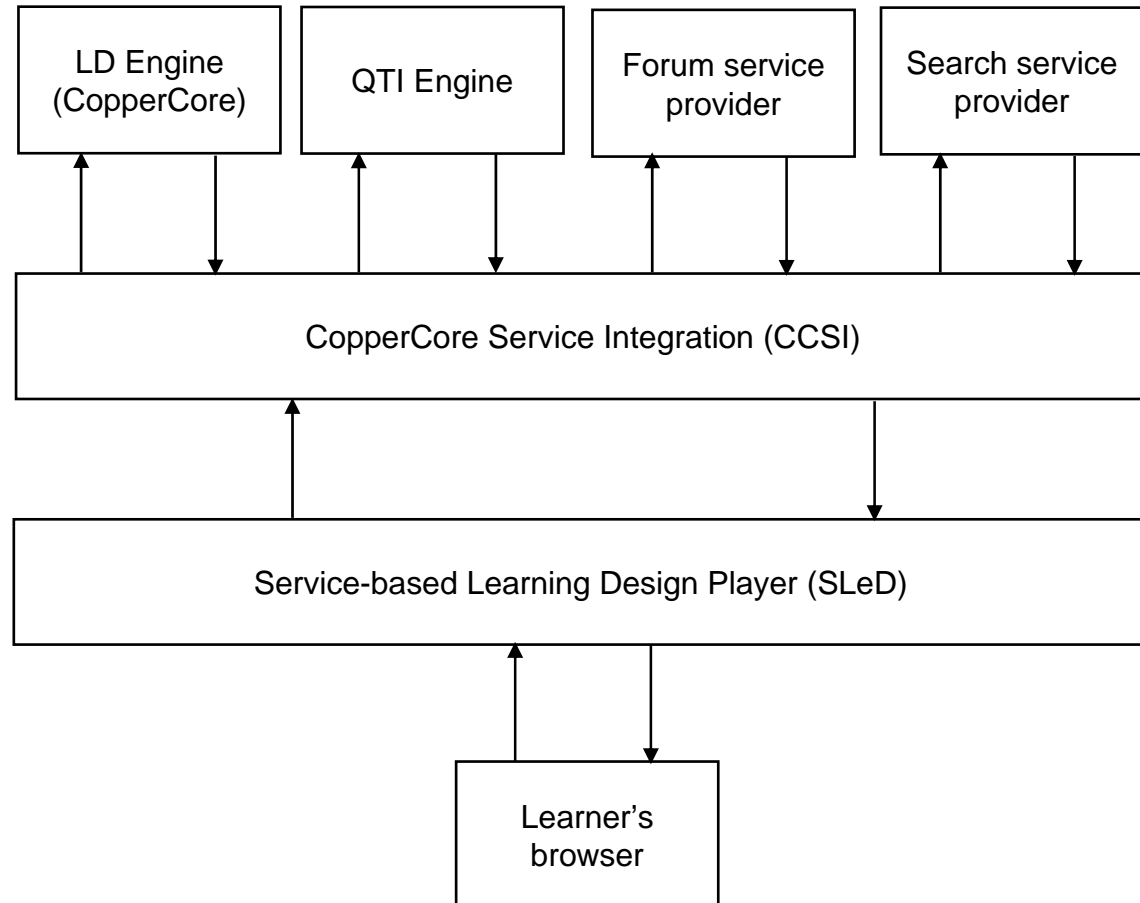
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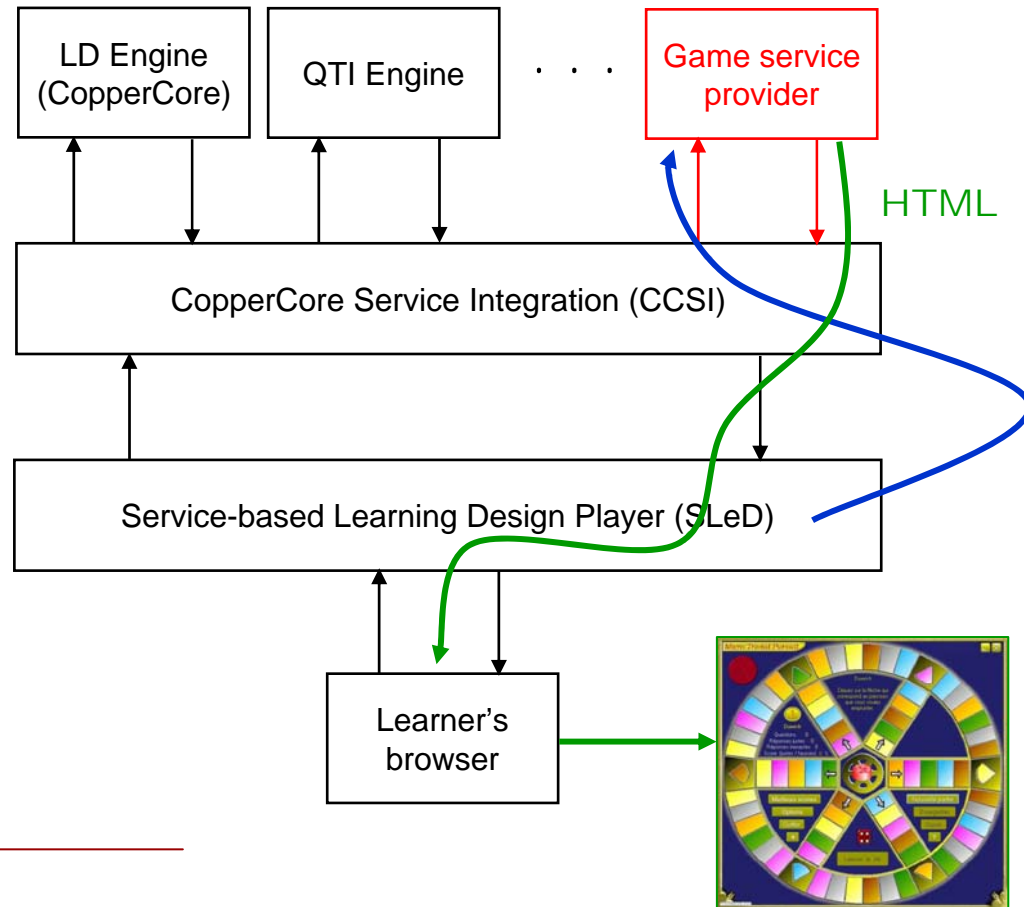
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## □ Design assumption

- Contents can be launched by interpreting some HTML code in the learner's browser
- Flash, Applet, Java WebStart ...



Get the HTML  
code to launch  
the game



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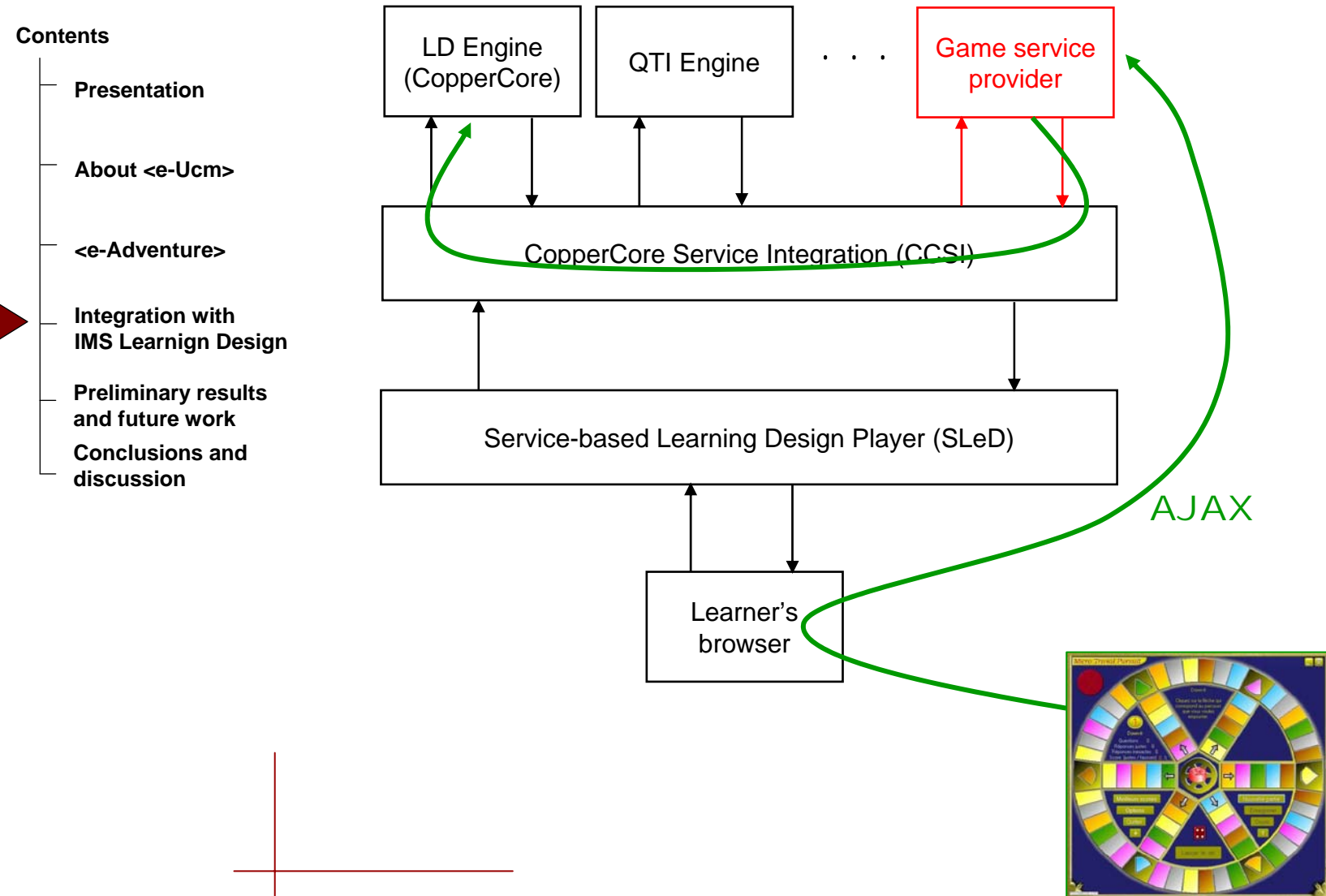
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- ☐ Games can report what happens while the user interacts with the content
- ☐ But, what information should be reported?
  - ☐ The most common unit of information in a UoL are its properties
  - ☐ Games are studied in terms of their *states*
  - ☐ Proposal: Associate specific game states with property-value pairs in the UoL
- ☐ When the games enter states associated with properties, the event is notified to the engine
  - ☐ Design decision: Notify the event when it happens, don't wait until the game ends



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### ☐ Games are a rich and adaptable medium

- ☐ Let's use this to our advantage

### ☐ Adaptable games

- ☐ Rich content can query the player for the state of the properties and act in consequence
- ☐ Games can be easier/harder, longer/shorter, internationalized, omit uninteresting levels, change the possible end-states, etc.

### ☐ Design decision: The game changes its initial state according to the properties of the Unit of Learning

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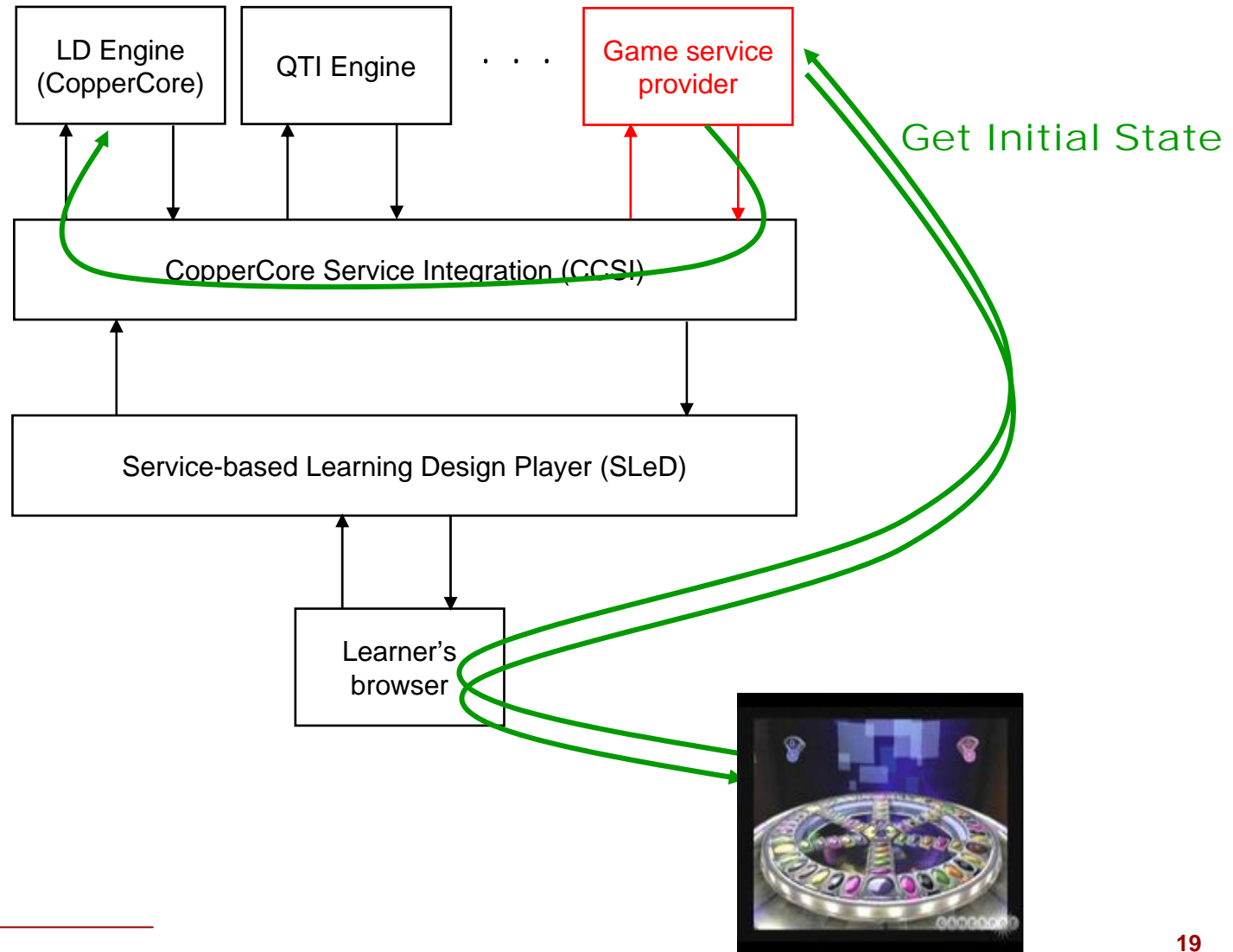
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- ☐ Modified version of SLeD
  - ☐ Recognizes a new content type “gamecontent”
  - ☐ Tries to locate (through CCSI) a game service to request the HTML code required to launch the game
- ☐ Modified version of CCSI
  - ☐ New generic adapter interface: GameAdapter
  - ☐ New adapter implementation: EAdventureAdapter
- ☐ eAdventureWebSupport web application
  - ☐ Provides the game service that generates the HTML code for <e-Adventure>
  - ☐ Provides listeners for the AJAX-invocations coming from the games
  - ☐ Uses CCSI to push and retrieve information from the CopperCore engine
  - ☐ Can be deployed in the same container as CCRT and SLeD
- ☐ AJAX implementation of the communication API for generic game applets

## ❑ Sample Unit of Learning: The art and craft of chocolate

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Content and test



Adaptable  
<e-Adventure>  
game

Path 1

Path 2

Path 3

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- ☐ Inclusion of the modifications in future versions of SLeD and CCSI
- ☐ Publish the eAdventureWebSupport application as opensource application
- ☐ Publish the communication APIs and data models
- ☐ Evaluation of the integration model
  - ☐ Integration of games other than <e-Adventure> games using the generic products obtained in this work
- ☐ Global reflection
  - ☐ Can this be extended to include all kinds of “intelligent” content?

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- ☐ Can the activities of a Unit of Learning be games? YES
- ☐ Does this have any advantages? YES
  - ☐ Adaptable content
  - ☐ Higher interactivity
  - ☐ Live report of results
- ☐ Does this work for any kind of game?
  - ☐ *Most* games can be deployed and launched as black boxes
  - ☐ Establishing a communication requires the game to be aware of its environment and to participate in the communication
- ☐ Value for CopperCore and CCSI
  - ☐ The communication CC → EA builds on the experience integrating CC and QTI
  - ☐ The communication EA → CC is new and should be evaluated
- ☐ Value for SleD
  - ☐ An experience in the introduction of a new content type
  - ☐ How can this procedure be made more modular?

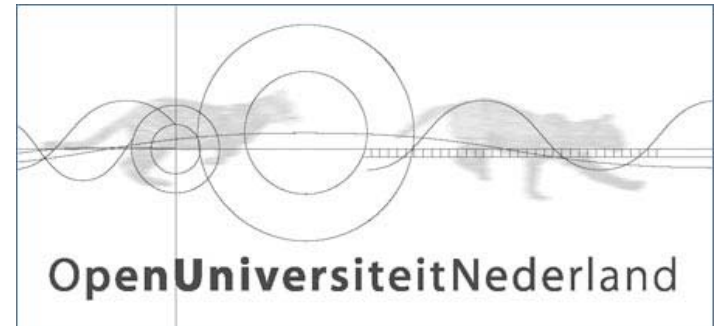


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